IMPACT OF CD ROM ON INFORMATION SERVICES

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THE MEDIUM . . .

- Resistant (Dirt, Heat, Scratches)
- Resilient (To Drops, Head Crashes)
- Unparalleled Error Correction
  (1 in 10^3 ⟶ 1 in 10^{12})
- Can Be Mailed With Impunity

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THE STORAGE . . .

- Data (550 MB)
- Text (150,000 Pages)
- Images (15,000)
- Sound (2 Hours)

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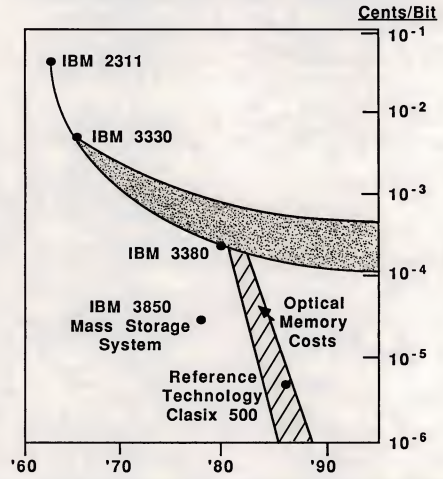
OPTICAL VERSUS MAGNETIC DISK STORAGE COSTS, 1960-2000



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THE PRODUCTS . . .

- Drives
- Workstations
- Software/Applications
- Data/Subscriptions

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NEGATIVES . . .

- No Write/Erase/Edit (Yet)
- Slow Access (1/2 to 1 Second)
- Difficult to Backup
- Expensive (But Getting Cheaper)
- Slow Turnaround for Data Disks (But Improving)

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BARRIERS TO MARKET PENETRATION

- Lack of Standards
  - Hardware
  - Software
- Start-up Costs Are High
  - CD ROM Is Expensive
  - Data File Creation Is Expensive
- User-specific Interfaces Needed

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MULTIMEDIA CAPABILITIES

- The Most Explosive Potential Offered by CD ROM
- Realistically a Small Opportunity for Now: No Established Expertise, Very Costly
- Some Scope for Text/Data, Image/Menus with Sound Over
- Best Market: Educational Tools

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CD ROM MARKETS: SOFTWARE DEPENDENT

- CD ROM Personalizes Data Base Use Like the PC Personalized Information Processing
- Main Added Value: Specific, User-profile/ Data Content-oriented Search Capabilities
- Generic Search/Index Software Available

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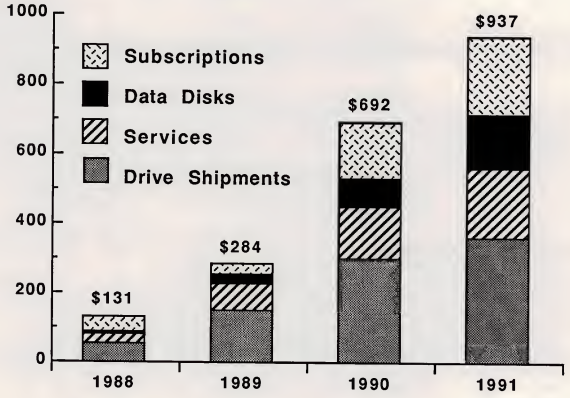
CD ROM MARKETS, 1986-1991



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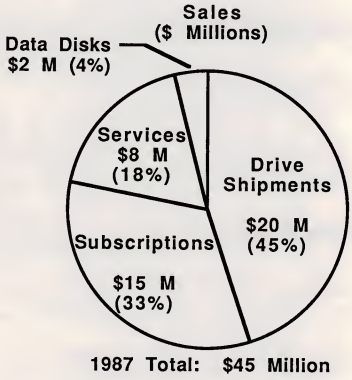
PERSONAL COMPUTER CD ROM MARKETS, 1987



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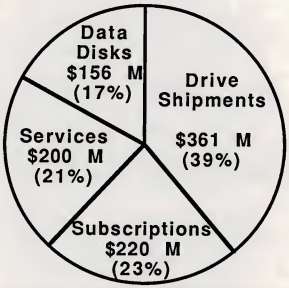
PERSONAL COMPUTER CD ROM MARKETS, 1991

Sales
($ Millions)



1991 Total: $937 Million

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CD ROM: "VIDEOTEXT" OR "PC" MARKET?

"Videotex-like"

- War among Vendors for Standards
- A "Revolution" Still Waiting to Happen

OR

"PC-like"

- Personalization of Storage
- Software-driven
- Explosion of Dealers, Vendors, and Products

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UNDERSTANDING CD ROM APPLICATIONS

- Data Content Dependent
- Not Time-sensitive
- Large Audience
  - Focused Groups of Professionals
  - Narrow Functionality

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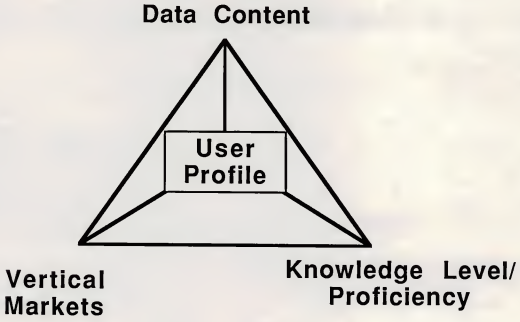
CD ROM APPLICATIONS



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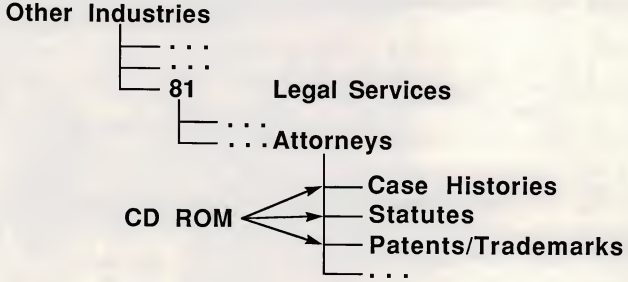
WHERE ARE THE CD ROM APPLICATIONS?



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CD ROM SOFTWARE OPPORTUNITIES

- Pre Retrieval
  - Knowing What to Ask
  - Knowing How to Ask It
  - Interfacing with User in User's Terminology
- Post Retrieval
  - Application-specific Processing of Retrieved Information
  - Current Software MAY Be Adaptable

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EXAMPLE OF CROSS-INDUSTRY APPLICATION FOR INDUSTRY-SPECIFIC MARKETS

- **Sample Tool:** CD ROM-based Street Map
- **Applications:** Sales Territory Assignment/ Call Planning, Market Analysis for Siting 24-hour ATM, Taxi Dispatching, Electrician Service Call Sequencing, etc.

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PRE RETRIEVAL, POST RETRIEVAL, AND WAYFINDING

- Intelligent Indexing
- Application-Specific Processing
- Navigating

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CD ROM - A MARKETING AND COMMUNICATIONS TOOL

Marketing

- Cut Costs
- Improve Information Distribution

Communications

- Unlimited Access to Semipermanent Information, Data and Text
- Off-load Mainframe Real Time Queries

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CD ROM: MARKETING TOOL

Example

- **Drug Manufacturers:** Spend $20K/Yr. on Each of 175,000 Physicians Writing Prescriptions

- One CD ROM Disk Could Deliver All of the Information Contained in 4,500 Medical Journals That Target This Tiny Distribution Channel

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CD ROM: COMMUNICATIONS TOOL

- Controlled Release of Large Volumes of Information to Broad Audience
- Look up/Reference Search/Authorization
- Examples: Pricing Lists, Maintenance Procedures, Engineering Diagrams, Standards

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ROLE ASSIGNMENT AND INTEGRATION: CRUCIAL TO MARKET DEVELOPMENT

- **Product Manufacturers Are Not the Best . . .**
  Software Designers, Who Are Not the Best . .
  Application Programmers, Who Are Not . . .
  . . . . . USERS!!

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CD ROM HARDWARE PRICES: TEMPORARY BARRIER

- Prices, in Volume, Have Fallen from $1,200 to $500 in One Year
- Expect a 20%/Annum Erosion over Next Three Years

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IMPACT OF CD ROM ON INFORMATION SERVICES VENDORS

- Opens Markets for PC Reference Storage Applications and 3rd Level SIC Workstations
- Impacts:
  - Hardcopy Publishing/COM
  - Software Developers (New Markets)
  - Turnkey System Vendors (New Markets)
  - RCS/OLDB Vendors (Hybrid Systems)

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CD ROM IMPACT ON PROCESSING SERVICES

- Positive:
  - New Hybrid Services ($525 M: 1991)
  - WORM Back-up Services
- Negative:
  - Online Data Base Services ($60 M: 1991)
  - COM Services ($40 M: 1991)
- No Impact on Facilities Management

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MINIMAL SELF IMPACT

- CD ROM Impact Fear Largely Unfounded
- Online Data Base Services Have Not Impacted Sales of Print Products (in Some Cases They Have Risen)
- Usually Control of the Data Is in the Hands of Publisher/Online Service Vendor

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CD ROM IMPACT ON RCS

- Nil on Real Time Applications
- Potential Impact on Archival/Historic Reference Data Base Services
- Hybrid Services Will Encourage RCS Use, On-site Hardware Services

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CD ROM VERSUS ONLINE DATA BASE

ITEM	OLDB	CD ROM
User Interface	Generic	Specific
User Type	Many	Single
Cost	Unpredictable	Fixed
Access	Short/Specific	Relaxed/T&E
Data Update	Daily	Quarterly

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CD ROM IMPACT ON TURNKEY SYSTEMS

- Big Opportunity for Customized Turnkey, Workstation-oriented Systems:
  - CD ROM Upgrades of Existing Systems
  - New CD ROM Systems
- Business/Professional Markets the Main Targets, Consumer Markets Later

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CD ROM IMPACT ON TURNKEY SYSTEMS

- Barrier to Growth Is Specialist Knowledge of 3rd Level SIC Markets
- New Opportunities That Expand Current Markets, Add New Markets
- CD ROM Manufacturers Will Look to Sign-up Dealers/Distributors with Software/Applications Expertise

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TURNKEY VENDORS MUST . . .

- Explore Multimedia Possibilities in Markets Currently Served

- Watch for Successful Startups Who Get a Foothold in Vertical Markets that Have Strategic Relevance to You

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CD ROM IMPACT ON SOFTWARE MARKETS

- Software Building Blocks Are Needed:
  - Operating System, I/O
  - Data Base Management
  - Utilities/File Conversion
- Menu-driven Applications, with Specific User Profiles, Require Teaming of Software Specialists, System Designers and Applications Specialists

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CD ROM IMPACT ON SOFTWARE PRODUCTS MARKET

- Largest Opportunity Is in Microcomputer Software: 5% of All Micro Software in 1991 Will Need to Be Able to Handle CD ROM Files

- CD ROM Is First in Long Line of PC Optical Storage Media that Will Generate $3 Billion of New Revenues by 1995

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CD ROM IMPACT ON PROFESSIONAL SERVICES

- New Markets Based on Expert Systems Design Knowledge in Vertical Markets
- Customized Software Development for Applications in Fortune 1000 Companies
- Less than 1% of $32 Billion Professional Services Market in 1991

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NET IMPACT OF CD ROM ON INFORMATION SERVICES

SERVICE DELIVERY MODE	NET IMPACT ($ M)	
	1986	1991
Processing/Network Services	*	$425
Software Products	*	610
Turnkey Systems	*	800
Professional Services	*	265
Total	(Small)	$2100

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ADOPTION OF CD ROM HINDERED

- Limited Marketing Strength of CD ROM Vendors, Absence of IBM
- User Inertia
- Limited Software Availability
- Extensive Hand-holding Needed

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CD ROM MARKET PENETRATION WILL BE SLOW

- User-profile/Data-specific Knowledge Is Scarce
- Information Providers Cautious
- Heavy Start-up Cost for Applications
- Standards Still a Problem

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CONCLUSION

- Fear and/or Greed Factor Is Missing So Far
- The Best Thing that Could Happen to the Market Is for One Large User Company to Be Very Successful in Implementing CD ROM
- Most Market Leaders Are (So Far) Small Companies

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CONCLUSION

- CD ROM Needs the Same "Creative Explosion" Support as the PC to Achieve Its Full Potential. Without It, CD ROM Will Languish

- CD ROM Is First in Long Line of Optical Storage Products that May Ultimately Replace Magnetic Storage.

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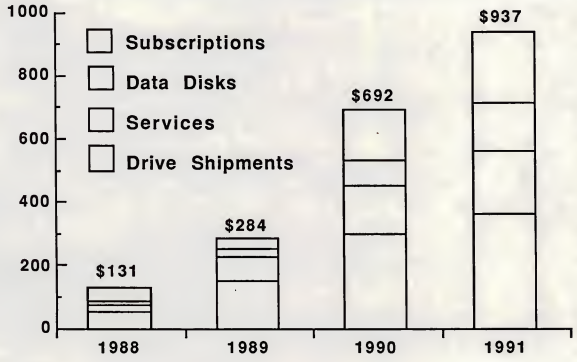
CD ROM MARKETS, 1986-1991



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